CLAIMS

1. A refrigeration system comprising:
- a Stirling machine (1) having a heating portion (1a) and a refrigerating portion (1b);
- a refrigerating chamber (4);
- a first thermal energy transfer device (2) operatively associated with the refrigerating portion (1b) and with the refrigerating chamber (4), so as to transfer heat from the latter to the refrigerating portion (1b) by means of a circulating fluid;
- a second thermal energy transfer device (3), operatively associated with a heat receiving means, external to said machine, and with the heating portion (1a) thereof, so as to transfer heat from the heating portion (1a) to the heat receiving means by means of a circulating fluid, characterized in that the first thermal energy transfer device (2) comprises at least one capillary pump (10) mounted in the refrigerating chamber (4) in order to evaporate, by the heat absorbed from the latter and by action of the pressure loss generated by the fluid passing through the capillary pump, the circulating fluid received in said capillary pump (10); a condenser (20) operatively coupled to the refrigerating portion (1b) of the Stirling machine (1), in order to condense the circulating fluid received, in the gaseous state, from the capillary pump (10); and pipes (30, 40) to conduct, in a closed loop, the circulating fluid, in the liquid state, from the condenser (20) to the capillary pump (10) and, in the gaseous state, from the latter to the condenser (20).

2. The refrigeration system according to claim 1, characterized in that the second thermal energy transfer device (3) comprises a capillary pump (50) operatively coupled to the heating portion (1) of the

Stirling machine (1) in order to evaporate, by the heat absorbed from said heating portion (1a) and by action of the pressure loss generated by the fluid passing through the capillary pump, the circulating fluid received in said capillary pump (50); a condenser (60) operatively associated with a heat receiving means external to the Stirling machine (1) in order to condense the circulating fluid received, in the gaseous state, from the capillary pump (50); and pipes (70, 80) to conduct in a closed loop the circulating fluid, in the liquid state, from the condenser (60) to the capillary pump (50) and, in the gaseous state, from the latter to the condenser (60).

3. The refrigeration system according to any one of claims 1 and 2, characterized in that the capillary pump (10, 50) comprises a shell (11, 51), provided with an inlet (11a, 51a) for the circulating fluid in the liquid state, and with an outlet (11b, 51b) for the circulating fluid in the gaseous state and which is spaced from the inlet (11a, 51a) and separated from the latter by a porous means (12, 52) lodged inside the shell (11, 51) and through which flows the circulating fluid, by generation of said pressure loss, from an inlet side to an outlet side of the porous means (12, 52), due to the pressure difference between both sides, while said circulating fluid is changing from the liquid state to the gaseous state, by evaporation, on the outlet side of the porous means (12, 52) that is exposed to the heat received from one of the parts defined by the refrigerating chamber (4) and the heating portion (1a) of the Stirling machine (1).

4. The refrigeration system according to claim 3, characterized in that the capillary pump (10) of the first thermal energy transfer device (2) has a shell

(11) in the form of an elongated pipe, which is transversally incorporated to and traverses a plurality of heat exchanging fins (13), which are disposed parallel to the direction of an airflow (F) to be refrigerated and which passes through the capillary pump (10), one of the ends of the shell (11) defining the inlet (11a) and the opposite end defining the outlet (11b) of the capillary pump (10), the porous means (12) presenting a tubular shape and having an end opened to the inlet (11a) and an opposite closed end that is adjacent to the outlet (11b), and longitudinal passages (12a) being further provided, between the porous means (12) and the shell (11), having closed ends that are adjacent to the inlet (11a), and opposite ends opened to the outlet (11b) of the shell (11), said longitudinal passages directing the circulating fluid, already in the gaseous state, to the outlet (11b) of the shell (11).

5. The refrigeration system according to claim 4, characterized in that the longitudinal passages (12a) are defined by longitudinal grooves provided in the porous means (12).

6. The refrigeration system according to claim 4, characterized in that a plurality of shells (11) are provided parallel to each other, incorporated to a plurality of fins (13), and mounted inside the refrigerating chamber (4).

7. The refrigeration system according to claim 3, characterized in that the capillary pump (50) of the second thermal energy transfer device (3) presents a shell (51) of annular shape, with an external wall receiving the inlet (51a) and with an internal wall associated with the outlet (51b), the porous means (52) having an annular shape and being lodged inside the shell (51), in order to be seated against the

internal and external walls of said shell (51), there being further provided: an annular gap (52a) defined between the porous means (52) and the external wall of the shell (51) and into which is opened the inlet (51a); a plurality of longitudinal passages (53) between the porous means (52) and the internal wall of the shell (51); and a channel (54) interconnecting circumferentially the longitudinal passages (53) and being opened to the outlet (51b) of the shell (51).

8. The refrigeration system according to claim 7, characterized in that the annular gap (52a) is defined by an external circumferential recess provided in the porous means (52).

9. The refrigeration system according to claim 7, characterized in that the channel (54) is defined by an internal circumferential recess provided close to one of the ends of the porous means (52).

10. The refrigeration system according to claim 7, characterized in that the longitudinal passages (53) are defined by grooves provided in the internal wall of the shell (51).

11. The refrigeration system according to claim 1, characterized in that the condenser (20) of the first thermal energy transfer device (2) comprises an annular shell (21), with an internal wall seated around the refrigerating portion (1b) of the Stirling machine (1), so as to transfer heat, by conduction, to the latter, said shell (21) being provided with an inlet (21a) and with an outlet (21b), which are respectively connected to pipes (40, 30) that conduct the circulating fluid in the gaseous state and in the liquid state, said inlet (21a) and outlet (21b) being interconnected inside the shell (21).

12. The refrigeration system according to claim 2, characterized in that the condenser (60) of the second

thermal energy transfer device (3) comprises a plurality of tubular shells which are parallel to each other and transversally incorporated to a plurality of fins (63), said shells having an end defining an inlet (61a) connected to the pipe (80) that conducts the circulating fluid in the gaseous state, and an opposite end defining an outlet (61b) connected to the pipe (70) that conducts the circulating fluid in the liquid state, said tubular shells and said fins (63) transferring heat to the environment in which the condenser (60) is mounted.